CLAIMS

We claim:

1. A process for producing solid polymer particles, the process comprising:

polymerizing, in a loop reaction zone, at least one monomer to produce a fluid slurry comprising solid polymer particles in a liquid medium;

withdrawing a portion of the slurry, comprising withdrawn liquid medium and withdrawn solid polymer particles, as an intermediate product of the process;

passing the intermediate product through a heated conduit, producing a concentrated intermediate product and a vapor;

separating the vapor from the concentrated intermediate product by centrifugal force in a cyclone;

passing the concentrated intermediate product to a receiving zone.

2. The process of claim 1 wherein at least about 90% of the vapor is separated from the concentrated intermediate product in the cyclone and passed to a filter zone.

3. The process of claim 1 wherein at least about 95% of the vapor is separated from the concentrated intermediate product in the cyclone and passed to a filter zone.

4. The process of claim 1 wherein at least about 99% of the vapor is separated from the concentrated intermediate product in the cyclone and passed to a filter zone.

5. The process of claim 1 wherein at least about 99.9% of the vapor is separated from the concentrated intermediate product in the cyclone and passed to a filter zone.

6. The process of claim 1 wherein at least about 99.99% of the vapor is separated from the concentrated intermediate product in the cyclone and passed to a filter zone.

7. The process of claim 1 further comprising:
passing the separated vapor from the cyclone to a filter; and
filtering fine polymer particles from the separated vapor.

8. The process of claim 1 wherein at least about 90% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

9. The process of claim 1 wherein at least about 95% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

10. The process of claim 1 wherein at least about 99% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

11. The process of claim 1 wherein at least about 99.9% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

12. The process of claim 1 wherein at least about 99.99% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

13. The process of claim 1 wherein at least about 99.999% of the polymer solids in the intermediate product are separated from the withdrawn medium in the cyclone.

14. The process of claim 1, wherein the portion of the slurry is continuously withdrawn from the reaction zone.

15. The process of claim 1, further comprising the step of maintaining a concentration of solid polymer particles in the slurry in the zone of greater than 40 weight percent.

16. The process of claim 1, wherein the separated vaporized diluent from the cyclone is condensed without compression by heat exchange with a fluid having temperature within the range of about 32 degrees F to about 200degrees F.

17. The process of claim 1 wherein the volume of the receiving zone is in the range of about 1000 to about 20,000 cubic feet.

18. The process of claim 1, further comprising the step of holding the polymer solids in the receiving zone for a polymer solids residence time sufficient to remove substantially all the unentrained diluent.

19. A process according to claim 21 wherein the polymer solids residence time is from about 10 seconds to about 30 minutes.

20. A process according to claim 21 wherein the polymer solids residence time is from about 30 to about 120 minutes.

21. A loop reactor apparatus comprising:

a pipe loop reactor adapted for conducting an olefin polymerization process comprising polymerizing at least one olefin monomer to produce a fluid slurry comprising solid olefin polymer particles in a liquid medium; and

at least one elongated hollow appendage in direct fluid communication with the pipe loop reactor adapted for removal of a portion of the fluid slurry from the piper loop reactor;

a flashline in fluid communication with the at least one elongated hollow appendage, wherein the flashline is surrounded by a conduit adapted for indirectly heating; and

a cyclone in fluid communication with the flashline.

22. The loop reactor apparatus of claim 21 further comprising:

a first chamber in fluid communication with the cyclone;

a second chamber in fluid communication with the first chamber; and

a first valve disposed between the first chamber and the second chamber;

a purge column in fluid communication with the second chamber.

a second valve disposed between the second chamber and the purge column; and

a controller for operating the first valve and the second chamber valve so that the valves are not open at the same time.

23. The loop reactor apparatus of claim 22 wherein the volume of the pipe loop reactor is in the range of 5,000 to 60,000 gallons.

24. The loop reactor apparatus of claim 21, wherein the cyclone comprises a vapor outlet and a solids outlet, and the loop reactor apparatus further comprises a fine polymer particle filter fluidly connected to the vapor outlet of the cyclone.

25. The loop reactor apparatus of claim 21 further comprising a funnel fluidly connected to and disposed between the flashline and the cyclone.

26. The loop reactor apparatus of claim 21 further comprising a level sensor in contact with the first chamber for sensing the level of polymer solids in the first chamber, wherein the level sensor is connected to the first valve, and is adapted to maintain a desired level of polymer solids in the first chamber.

27. The loop reactor apparatus of claim 21 further comprising a timer connected to the first valve, wherein the timer determines the opening and closing of the first valve, so that the polymer solids are maintained in the first chamber for a desired time.